WHAT IS CLAIMED IS:

1. A method for fabricating a semiconductor laser device, the semiconductor laser device comprising: a first semiconductor laminated structure which is provided on a front-side region of a substrate and includes a first active layer for oscillating a first laser beam having a first wavelength . band; and a second semiconductor laminated structure which is provided on a rear-side region of the substrate and includes a second active layer for oscillating a second laser beam having a second wavelength band, the method comprising the steps of:

growing a first tentative semiconductor laminated structure having the same laminated structure as the second semiconductor laminated structure on the substrate;

removing a front-side portion of the first tentative semiconductor laminated structure, thereby producing the second semiconductor laminated structure on the rear-side region of the substrate;

growing a second tentative semiconductor laminated structure having the same laminated structure as the first semiconductor laminated structure on the front-side region of the substrate and on the second semiconductor laminated structure; and

removing a portion of the second tentative semiconductor . laminated structure above the second semiconductor laminated structure, thereby producing the first semiconductor laminated structure on the front-side region of the substrate.

2. The method for fabricating a semiconductor laser device of claim 1, wherein an emission direction of the first laser beam and an emission direction of the second laser beam are collinear with each other.

3. The method for fabricating a semiconductor laser device of claim 1, wherein an emission direction of the second laser beam is above or below an emission direction of the first laser beam.

4. The method for fabricating a semiconductor laser device of claim 1, wherein an energy gap of the first active layer is greater than an energy gap of the second active layer.

5. The method for fabricating a semiconductor laser device of claim 1, wherein:

the first active layer contains indium and phosphorus; and

the second active layer contains gallium and arsenic.

6. The method for fabricating a semiconductor laser device of claim 1, further comprising the steps of:

coating a front surface of the first semiconductor laminated structure with a non-reflection coating layer; and

coating a rear surface of the second semiconductor laminated structure with a high-reflection coating layer.

7. A method for fabricating a semiconductor laser device, the semiconductor laser device comprising: a first semiconductor laminated structure which is provided on a front-side region of a substrate and includes a first active layer for oscillating a first laser beam having a first wavelength band; and a Second semiconductor laminated structure which is provided on a rear-side region of the substrate and includes a second active layer for oscillating a second laser beam having a second wavelength band, the method comprising the steps of:

growing a first tentative semiconductor laminated structure having the same laminated structure as the first semiconductor laminated structure on the substrate;

removing a rear-side portion of the first tentative semiconductor laminated structure, thereby producing the first semiconductor laminated structure on the front-side region of the substrate;

growing a second tentative semiconductor laminated structure having the same laminated structure as the second semiconductor laminated structure on the rear-side region of the substrate and on the first semiconductor laminated structure; and

removing a portion of the second tentative semiconductor laminated structure above the first semiconductor laminated structure, thereby producing the second semiconductor laminated structure on the rear-side region of the substrate.

8. The method for fabricating a semiconductor laser device of claim 7, wherein an emission direction of the first laser beam and an emission direction of the second laser beam are collinear with each other.

9. The method for fabricating a semiconductor laser device of claim 7, wherein an emission direction of the second laser beam is above or below an emission direction of the first laser beam.

10. The method for fabricating a semiconductor laser device of claim 7, wherein an energy gap of the first active layer is greater than an energy gap of the second active layer.

11. The method for fabricating a semiconductor laser device of claim 7, wherein:

the first active layer contains indium and phosphorus; and

the second active layer contains gallium and arsenic.

12. The method for fabricating a semiconductor laser device of claim 7, further comprising the steps of:

coating a front surface of the first semiconductor laminated structure with a non-reflection coating layer; and

coating a rear surface of the second semiconductor laminated structure with a high-reflection coating layer.

13. A method for fabricating a semiconductor laser device, comprising:

a first step of providing a first laser chip including a first active layer for oscillating a first laser beam having a first wavelength band and a second laser chip including a second active layer for oscillating a second laser beam having a second wavelength band; and

a second step of fixing the first laser chip to a front-side region of a substrate and fixing the second laser chip to a rear-side region of the substrate,

wherein the second step comprises the step of fixing the first laser chip and the second laser chip so that an emission direction of the first laser beam and an emission direction of the second laser beam are same.

14. The method for fabricating a semiconductor laser device of claim 13, wherein the emission direction of the first laser beam and the emission direction of the second laser beam are collinear with each other.

15. The method for fabricating a semiconductor laser device of claim 13, wherein the emission direction of the second laser beam is above or below the emission direction of the first laser beam.

16. The method for fabricating a semiconductor laser device of claim 13, wherein an energy gap of the first active layer is greater than an energy gap of the second active layer.

17. The method for fabricating a semiconductor laser device of claim 13, wherein:
the first active layer contains indium and phosphorus; and
the second active layer contains gallium and arsenic.

18. The method for fabricating a semiconductor laser device of claim 13, wherein after the second step, the method further comprises the step of filling a gap between a rear surface of the first laser chip and a front surface of the second laser chip with a dielectric member having a refractive index which is between an effective refractive index of a stripe region of the first active layer and an effective refractive index of a stripe region of the second active layer.

19. A method for fabricating a semiconductor laser device, comprising:

a first step of providing a first laser chip including a first active layer for oscillating a first laser beam having a first wavelength band, a second laser chip including a second active layer for oscillating a second laser beam having a second wavelength band, and a third laser chip including a third active layer for oscillating a third laser beam having a third wavelength band; and

a second step of fixing the first laser chip to a front-side region of a substrate, fixing the second laser chip to a central region of the substrate, and fixing the third laser chip to a rear-side region of the substrate, wherein the second step comprises the step of fixing the first laser chip, the second laser chip and the third laser chip so that an emission direction of the first laser beam, an emission direction of the second laser beam, and an emission direction of the third laser beam are same.

20. The method for fabricating a semiconductor laser device of claim 19, wherein the emission direction of the third laser beam is collinear with the emission direction of the first laser beam or the emission direction of the second laser beam.

21. The method for fabricating a semiconductor laser device of claim 19, wherein:

an energy gap of the first active layer is greater than an energy gap of the second active layer; and

the energy gap of the second active layer is greater than an energy gap of the third active layer.

22. The method for fabricating a semiconductor laser device of claim 19, wherein:

the first active layer contains gallium and nitrogen;

the second active layer contains indium and phosphorus; and

the third active layer contains gallium and arsenic.

23. The method for fabricating a semiconductor laser device of claim 19, wherein after the second step, the method further comprises the steps of:

filling a gap between a rear surface of the first laser chip and a front surface of the second laser chip with a first dielectric member having a refractive index which is between an effective refractive index of a stripe region of the first active layer and an effective refractive index of a stripe region of the second active layer; and

filling a gap between a rear surface of the second laser chip and a front surface of the third laser chip with a second dielectric member having a refractive index which is between the effective refractive index of the stripe region of the second active layer and an effective refractive index of a stripe region of the third active layer.